The costs of internal devaluation in the EA

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Outline

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Motivation:

- EU's strategy of adjusting: 'internal devaluation' which presupposes wage suppression in the deficit countries
- Deflationary vs. inflationary adjustment

Question:

- Given past experience, what is the expected output cost of eliminating current account deficits?

The Model:

- Simple old Keynesian model
- panel analysis (EA countries, 1999-2011): (i) current account equation, (ii) Phillips curve, (iii) Okun's law
- Total effects

Deflationary adjustment (labour devaluation)

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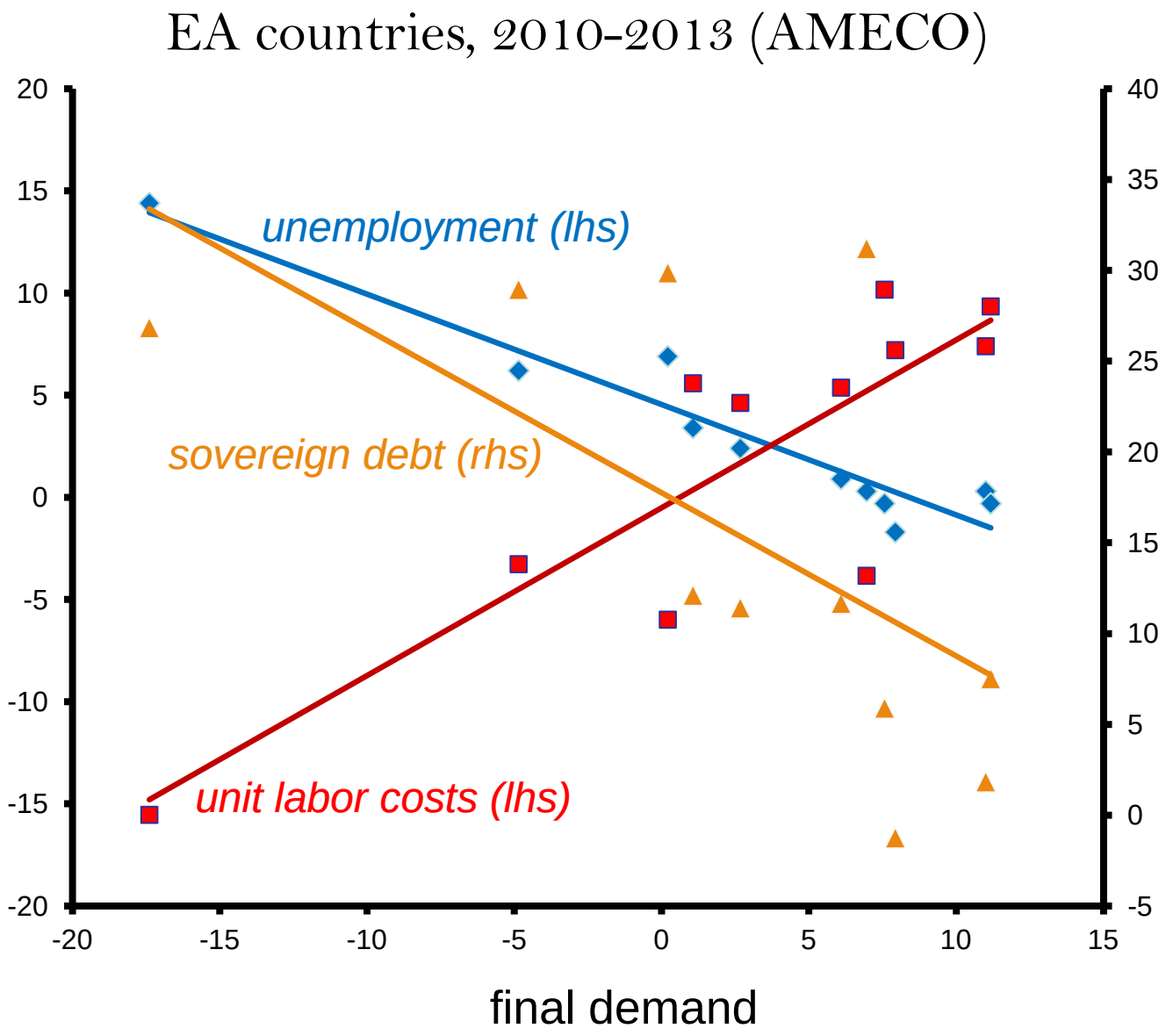

Trade imbalances in the EA

	CA 2007	CA 2012	ULC: 1999-2007
EA12			11.63
Netherlands	8.41	8.23	16.41
Germany	7.51	6.39	-1.66
Finland	4.20	-1.56	8.41
Austria	3.97	2.97	4.41
Belgium	3.93	0.95	12.52
Italy	-1.29	-0.52	17.80
France	-1.36	-1.78	14.21
Ireland	-5.54	4.95	26.93
Spain	-9.99	-0.85	23.71
Portugal	-10.16	-1.87	19.81
Greece	-17.63	-5.32	18.04
GIIPS(5)	***-8.92***	***-0.72***	***21.26***
non-GIIPS	***4.45***	***2.53***	***9.05***

Source: AMECO (CA as % of GDP)

Motivation

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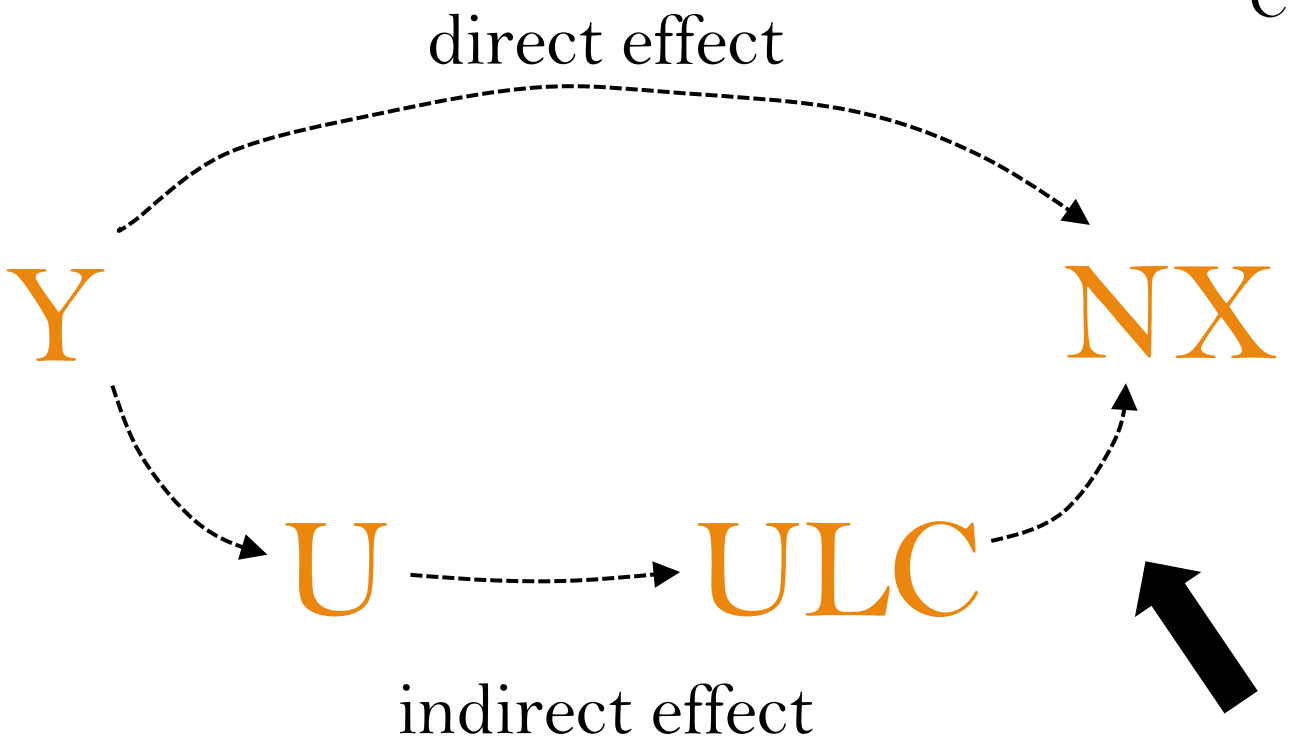
- Euro crisis. Widely recognised that current account imbalances are part of the problem ('bad imbalances').
- Some sort of rebalancing is necessary, but clearly not sufficient (sovereign debt crisis, household debt...) to overcome crisis.
- EU official narrative: adjustment in deficit countries, fiscal discipline and 'internal devaluation'.
- Phillips Curve literature: this is costly ('sacrifice ratio').
- **How costly?**

The model: an old Keynesian one

It builds on (older) Phillips Curve literature and (more recent) Current Account literature.



Note: *The Phillips Curve only covers one channel:* $Y \rightarrow u \rightarrow ULC$. *Our approach by design gets lower sacrifice ratios.*

The model

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The current account equation:

$$\Delta CA = a_1 \cdot \Delta \log(Y) + a_2 \cdot \Delta \log(ULC)$$

The Phillips curve:

$$\Delta \log(ULC) = b_1 \cdot \Delta U + b_2 \cdot \Delta \log(PM) + b_3 \cdot \Delta \log(ULC_{t-1})$$

The Okun's Law equation:

$$\Delta U = c_0 + c_1 \cdot \Delta \log(Y)$$

Adding things up: $$\frac{\Delta CA}{\Delta \log(Y)} = a_1 \cdot + \frac{a_2 b_1 c_1}{1 - b_3}$$

The model

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- Panel analysis
- Euro area countries
- Annual data (source: AMECO)
- 3 samples: 1999-2011; 1990-2011; recession years (1990-2011)
- Why panel? Changes over time and precision

Literature on current account imbalances

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NX = f(REER, Y)

- **competitiveness vs growth (demand)**

• Arghyrou & Chortareas (2008): individual country cointegration: REER
• Belke & Dreger (2011): catching up vs competitiveness (real exchange rate): panel cointegration 1980-2010, competitiveness (REER) more robust
• Berger & Nitsch (2010)

NX = S(.)-I(.) + (T-G) - Emphasis on investment-saving decisions and underlying institutions

• Eichengreen (2010)
• Jaumotte and Sodsriwiboon (2010)
• Ahearne, Schmitz, & von Hagen (2008)
• Barnes, Lawson, Radziwill (2010)
• Lane (2010)
• Holinski, Kool, Muysken (2010)
• Decressin and Stavrev (2009)

Literature on current account imbalances

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Table 2. Overview of empirical literature on current account imbalances

Study	Dep. variable	Explanatory. Variables	Estimation Method	Sample	Notes
Arghyrou and Chortareas (2008)	CA, REER, Y, Y* (foreign income)		VAR	EA countries, quarterly data: 1975-2005	important differences across EMU countries regarding the significance of each variable in the determination of CA equilibrium.
Belke and Dreger (2011)	CA	Ypc, REER	panel	Annual data, 11 EA, 1982-2008	competitiveness channel is more robust and shows the expected sign
Berger and Nitsch (2010)	Bilateral trade balance	G differentials and volatility, REER, GGB, institutional variables	Panel	EU15 + 3 countries, Annual data: 1948-2008	with the introduction of the euro, trade imbalances among euro area members widened considerably and became more persistent
Blanchard and Giavazzi (2002)	CA	Ypc in relation to an average level of Ypc	Panel	Annual data: 1975-2001, different groups of OECD and EU countries	It is with saving rather than investment as the main channel through which integration affects current account balances
Ahearne, Schmitz, and Hagen (2008)	NX (as proxy of CA)	Ypc, GGB Poil, dummy for EMU	Panel	EU-15, Annual data (1981-2005),	By eliminating exchange rate risk the Euro has boosted financial flows from high-income to low-income countries in the euro area (not outside).
Jaumotte and Sodsriwiboon (2010)	CA, S, I	GGB, population growth, future old-age dependency ratio, oil balance, financial liberalization, dummies	Panel	49 advanced and emerging economies	The Euro helped southern EA countries to maintain investment despite lower saving rates by improving their access to international saving. That does not necessarily imply optimal or sustainable process.
Eichengreen (2010)	NX (as proxy of net capital flows)	Ypc, corruption index, GGB, private credit, RIR, elderly dependency ratio	Panel	EU countries, Annual data (1999-2009), F	Convergence is conditional not just on the gap in per capita incomes but also on the quality of policies and institutions. "bad imbalances" driven by domestic distortions: bubble-driven asset booms, excessive budget deficits, and unrealistic expectations of future growth.
Barnes, Lawson, and Radziwill (2010)	CA	demographic variables, G, Ypc, initial NFA, Poil prices, RIR, GGB, structural rigidities, trade openness, institutional quality, financial depending	Panel	Sample of OECD countries, averages of 5 years period	'Fundamental' economic factors play an important role but do not fully explain the extent of imbalances over the past decade.
Decressin and Stavrev (2009)	CA	F, NFA, GGB, NXoil, REER, demographic variables	Panel and time series	Annual data, EA-11 and 13 other advanced countries	differences between EMU countries' current accounts, are not unusual by historical standards, not different from a broad sample of advanced economies outside the EA. What different is the current account dynamics.

Notes: CA is the current account, NX net exports, S saving, I investment, Y real GDP, Ypc real per capita GDP, R real GDP growth, REER real exchange rate, GGB general government balance, NFA net foreign assets, EA Euro area, Poil oil prices, RIR real interest rate

Current account equation: results

$$\Delta CA = a_1 \cdot \Delta \log(Y) + a_2 \cdot \Delta \log(ULC)$$

dependent variable	d(CA)		d(CA)		d(CA)	
Sample	1999-2011		1990-2011		recessions: 1990-2011	
Periods	13		22		8	
Cross-sections	12		12		12	
Obs	156		264		35	
	coeff.	t-stat	coeff.	t-stat	coeff.	t-stat
C	*0.637*	*3.1*	*0.524*	*3.29*	*1.25*	*2.5*
DLOG(Y)	*-13.572*	*-2.8*	*-14.227*	*-3.8*	*-5.08*	*-0.4*
DLOG(ULC)	*-24.8*	*-4.2*	*-9.74*	*-2.9*	*-19.3*	*-2.4*

Other CA equations (summary): implied long-run effects

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	diff	ADL	ECM	ECM (rel)	ADL90-11
sample	*1999-2011*	*1999-2011*	*1999-2011*	*1999-2011*	*1990-2011*
Y	-13.57	-14.62	-2.81	-9.74	-79.21
UCL	-24.80	-76.58	-14.04	-30.83	-62.10

Y not stat sign!

uses Yj/Yea, ULCj/ULCea

Dependent Variable: D(CA_)			Dependent Variable: CA_			Dependent Variable: D(CA_)			Dependent Variable: D(CA_)			Dependent Variable: CA_		
Sample: 1999 2011			Sample: 1999 2011			Sample: 1999 2011			Sample: 1999 2011			Sample: 1990 2011		
	coeff	t-tstat		coeff	t-tstat		coeff	t-tstat		coeff	t-tstat		coeff	t-tstat
C	0.64	3.07	C	0.45	2.40	C	-13.75	-1.41	C	34.28	3.54	C	0.391198	2.439798
DLOG(Y_R_)	-13.57	-2.78	DLOG(Y_R_)	-4.64	-1.00	DLOG(Y_R_)	-15.60	-3.03	DLOG(Y_R_)	-16.47	-2.96	DLOG(Y_R_)	-9.22279	-2.32572
DLOG(ULC_)	-24.80	-4.25	DLOG(ULC_)	-24.33	-4.63	DLOG(ULC_)	-33.31	-5.75	DLOG(ULC_)	-32.30	-4.76	DLOG(ULC_)	-7.23011	-2.14746
			CA_(-1)	0.68	12.61	CA_(-1)	-0.49	-7.22	CA_(-1)	-0.41	-6.81	CA_(-1)	0.883566	26.55687
						LOG(Y_R_(-1)/Y_R_EA(-1))	-4.75	-1.53	LOG(Y_R_(-1))	-1.14	-0.42			
						LOG(ULC_(-1)/ULC_EA(-1))	-15.04	-3.04	LOG(ULC_(-1))	-5.70	-1.72			
R-squared	0.165814		R-squared	0.953955		R-squared	0.403676		R-squared	0.386448		R-squared	0.937167	
Adjusted R-squared	0.089445		Adjusted R-squared	0.949383		Adjusted R-squared	0.335034		Adjusted R-squared	0.315824		Adjusted R-squared	0.933634	
S.E. of regression	1.642341		S.E. of regression	1.477413		S.E. of regression	1.403492		S.E. of regression	1.423621		S.E. of regression	1.519311	
Sum squared resid	383.0145		Sum squared resid	307.7677		Sum squared resid	273.8008		Sum squared resid	281.7108		Sum squared resid	574.7684	
Log likelihood	-291.415		Log likelihood	-274.355		Log likelihood	-265.233		Log likelihood	-267.454		Log likelihood	-477.298	
F-statistic	2.171222		F-statistic	208.6583		F-statistic	5.880922		F-statistic	5.471863		F-statistic	265.2767	
Prob(F-statistic)	0.013594		Prob(F-statistic)	0		Prob(F-statistic)	0		Prob(F-statistic)	0		Prob(F-statistic)	0	
Mean dependent var	-0.10372			-0.11256			-0.10372			-0.10372			0.320391	
S.D. dependent var	1.721117			6.566803			1.721117			1.721117			5.897583	
Akaike info criterion	3.915581			3.709674			3.618371			3.646851			3.729532	
Schwarz criterion	4.189286			4.002929			3.950727			3.979207			3.93271	
Hannan-Quinn criter.	4.026748			3.828782			3.753359			3.78184			3.811175	
Durbin-Watson stat	2.289099			2.063758			1.96489			2.073657			2.025182	

CA imbalances: cost or demand driven?

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- Both
- cost (price) component has become more important over time (because of Euro?)
- Costs matter also for Germany (Stockhammer et al 2011)
- Important for adjustment policies

Phillips Curve

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$$\Delta \log(ULC_t) = b_0 + b_1 \cdot \Delta \log(ULC_{t-1}) + b_2 \cdot \Delta \log(PM_t) + b_3 \cdot \Delta U$$

- Gordon's (1997) triangular PC (demand, supply shocks, past inflation)
- Instead of u,Δu, GAP or growth
- New Keynesian Phillips Curve: all excited about P^{exp} instead of P_{t-1}
- But how to measure P^{exp}
- In practise both P^{exp} and P_{t-1} ('hybrid NKPC')
- We are old fashioned here

Phillips Curve

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Table 4. Overview of empirical literature on Phillips curves.

Study	Sample	Estimation	Notes
Aguiar and Martins (2005)	Quarterly data (1970:1-2002:3), EA	Gordon-type PC (GDP deflator, imports deflator)	PC turns out to be linear and its trade-off statistically significant. Non-linearity shows up in the Okun relation.
Beccarini and Gros (2008)	EA, US, Quarterly data (1996:1-2008:1). *Inflation*: Headline HCPI, core inflation, Output gap, HP filtered GDP	PC (Gordon-type) with oil prices for headline, PC (Gordon) with oil prices for core	The mean and the volatility of inflation appear to be higher in the past decade. The impact of oil prices is more persistent in the EA, and the slope coefficient is higher in the EA than in the US.
Buchmann (2009)	Monthly data (1990-2008), EA	Nonparametric and parametric estimation of hybrid-NKPC	Doubts on the validity of the New Keynesian Phillips curve. Estimates reveal an important nonlinearity in the sense that demand pressure on price inflation is not invariant to the state of the economy as it increases considerably at times of high economic activity.
Chortareas et al (2011)	Quarterly data (1970:1-2007:4), EA	Hybrid-NKPC (GDP deflator, real unit labor cost)	Estimations are consistent with the pure NKPC but also with the central banks' perseverance to anchor inflation expectations when inflation is high.
Fabiani and Morgan (2003)	Quarterly data (1982:1-2000:4), national and aggregate level for DE, FR, IT, NL, ES	Gordon-type PC (ulc, consumers' expenditure deflator, import deflatior, gap between unemployment and time-varying NAIRU)	Major advantages arise from the ability to develop country-specific structures for PC and not from aggregation biases that emerge when a common structure is used.
Galí et al (2001)	Quarterly data (1970:1-1998:2), EA and US	Traditional PC, pure and hybrid NKPC (GDP deflator, real unit labor costs)	Hybrid-NKPC fits Euro area data very well (better than US data). Inflation dynamics in the EA appear to have a stronger forward-looking component than in the US. Labour market frictions appear to have played a key role in shaping the behavior of marginal costs and inflation in EA.
Gorter (2005)	Quarterly data (1991:3-2004:4); countries: FR, DE, IT	NKPC with different specifications for marginal costs (output gap, real unit labour costs, open economy measures)	For France and Germany plausible estimations are received only when taking into account open economy factors affecting real marginal costs and subsequently the inflation process. For Germany and Italy (but not France) lagged inflation is a significant determinant of current inflation.
McAdam and Willman (2004)	Quarterly data (1970:1-1997:4), EA	NKPC, hybrid-NKPC (GDP deflator, marginal costs captured by sector based estimation using a production function)	Underlying determinants of NKPCs has general applicability to a wide set of countries as well as of use for sectoral studies.
Montoya and Döhring (2011)	Quarterly data (1990:1-2010:4), EA-11 (panel and time series)	Hybrid-NKPC (output gap, HICP core inflation, unit labor costs)	Evidence for both backward and forward looking inflation. The impact of the output gap on core inflation is significant but not large.

Phillips Curve

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			Although the heterogeneity of Phillips curve relationships across EA economies is not large, the exceptionally large output gap caused by the crisis is one driver (among others) of the recently observed inflation differentials in the euro area.
Musso et al. (2007)	EA, quarterly data (AWM database: 1970:1-2005:4); *Inflation*: GDP deflator, HICP; Several alternative specifications of output gap	Linear PC (Gordon-type), PC (Gordon) with time-varying slope and intercept	No significant evidence of non-linearity. The Phillips curve became flatter around a lower mean of inflation.
Paloviita (2008)	Annual data (1981-2006; 1990-2006 for pooled estimates)	NKPC, hybrid NKPC	Hybrid specification of the New Keynesian Phillips curve is needed in order to capture the euro area inflation process properly. In recent years of low and stable inflation, EA inflation dynamics have become more forward-looking and the link between inflation and domestic demand has weakened.
Pyyhtiä (1999)	Annual data (1976-1997), EA and country specific (AT, DE, FI, FR, IT, NL, ES)	NKPC with quadratic output gap (GDP deflator, output gap).	The Phillips curve has been especially asymmetric in Germany, Finland, Italy, the Netherlands and Spain. Strong negative influence of inflation uncertainty on GDP in the euro countries during the estimation period, 1976– 1997.
Rumler (2007)	Quarterly data (1980-2004), EA, AT, BE, DE, ES, FR, EL, IT, NL	Open-economy versions of hybrid-NKPC (GDP deflator, labour share, domestic and imported intermediate goods prices)	The estimates of the structural parameters of the model suggest strong heterogeneity in the degree of price rigidity across euro area counties. Price rigidity is systematically lower in the open economy specification than in the closed economy specification.
Scheufele (2010)	Quarterly data (1973:1-2004:4), DE	Hybrid-NKPC (GDP deflator, labour income share as marginal cost)	Evidence for a purely NKPC for Germany.
Tillmann (2009)	Quarterly data (1970:1-2005:4), EA	NKPC, hubrid-NKPC (GDP deflator, labor share), VAR methodology	Purely forward-looking as well as for the hybrid model cannot be interpreted as it is done in the literature due to the immensely wide confidence intervals.
Turner and Seghezza (1999)	Semi-annual data (1970-1997)	Gordon-type PC (output gap, output deflator of business sector, imports deflator)	Most countries accept a common sacrifice ratio of about 3¾.

Phillips Curve

$$\Delta \log(ULC_t) = b_0 + b_1 \cdot \Delta \log(ULC_{t-1}) + b_2 \cdot \Delta \log(PM_t) + b_3 \cdot \Delta U$$

Dep Var:	**DLOG(ULC_)**		**DLOG(ULC_)**		**DLOG(ULC_)**	
	1999-2011		1990-2011		recessions 1990 2011	
periods	13		22		8	
sections	12		12		12	
obs	156		264		35	
	coeff	t-stat	coeff	t-stat	coeff	t-stat
C	*0.009*	*3.3*	*0.005*	*2.6*	*0.023*	*2.4*
D(U_/100)	*-0.391*	*-2.6*	*-0.536*	*-4.5*	*-1.497*	*-4.1*
DLOG(ULC_(-1))	*0.405*	*5*	*0.624*	*13*	*0.737*	*5.4*
DLOG(PM_(-1))	*0.207*	*4.3*	*0.199*	*5.1*	*0.319*	*2.3*
R-squared	*0.267*		*0.526*		*0.756*	
DW	*2.203*		*2.285*		*2.602*	
LR effect	**-0.657**		**-1.424**		**-5.687**	

Phillips Curve: some more literature

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- **Turner and Seghazza (1999 OECD working paper):** "The single equation results suggest that for sixteen out of the twenty-one OECD countries examined there is a well determined long-run effect from the output gap on inflation. Although, in some cases, tests reject the imposition of common coefficients, there is a high degree of similarity across all the countries being considered. In particular, using a system estimation technique (on a slightly smaller sample of seventeen countries) it is possible to impose the restriction that all but two countries have a common sacrifice ratio of about 3¾" (p. 10).

- SR = years of output loss for 1% inflation

- Similar: Fabiani and Morgan (2003)

Okun's Law

$$\Delta U_t = c_0 + c_1 \cdot \Delta \log(Y_t) + \varepsilon_t$$

Dep. Var.:	**D(U_/100)**		**D(U_/100)**		**D(U_/100)**	
Sample	1999-2011		1990-2011		recessions 1990-2011	
periods	13		22		8	
sections	12		12		12	
obs	156		264		35	
	coeff	t-stat	coeff	t-stat	coeff	t-stat
C	*0.006*	*5.3*	*0.007*	*7.1*	*0*	*2.8*
DLOG(Y)	*-0.259*	*-10*	*-0.262*	*-12*	*-0.3*	*-2.3*

Total effects (sample 1999-2011)

Direct effect of Y on NX ($Y \rightarrow NX$) as well as indirect effects $Y \rightarrow u \rightarrow ULC \rightarrow NX$

$$\Delta(CA) = -0.14 \cdot \Delta \log(Y) - 0.25 \cdot \Delta \log(ULC_t)$$

$$\Delta \log(ULC_t) = 0.21 \cdot \Delta(PM_t) - 0.39 \cdot \Delta U + 0.4 \cdot \Delta \log(ULC_{t-1})$$

$$\Delta U_t = -0.31 \cdot \Delta \log(Y_t)$$

$$\frac{\partial \Delta CA}{\partial \Delta \log(Y)} = a_1 \cdot + \frac{a_2 b_1 c_1}{1 - b_3} = -0.19$$

Summary results

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	1999 2011	1990 2011	recessions 1990 2011
dir dCA/dY	-0.14	-0.14	-0.05
indir dCA/dULC.dULC/dU.dU/dY			
dCA/dULC	-0.25	-0.10	-0.19
dULC/dU	-0.66	-1.42	-5.69
dU/dY	-0.26	-0.26	-0.28
sum	-0.04	-0.04	-0.30
total dCA/dY	-0.18	-0.18	-0.35
how much less growth for -1%pt dCA	-5.62	-5.60	-2.82
to reduce all imbalances of 2007 PIGS5	-47.20	-47.04	-23.72

Overview of total effects

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	99-11		**90-11**	**rec**	**07-11**		**80-11**			**99-11**				**90-11**
	p9911	p9911restr	p9011	p-rec	p0711		DE	GR		diff	ADL	ECM (rel)	ECM	ADL90-11
dir dCA/dY	**-13.57**	**-14.23**	**-14.23**	**-5.08**	**-21.20**		**-21.70**	**-31.15**		**-13.57**	**-14.62**	**-9.74**	**-2.81**	**-79.21**
indir dCA/dY														
dCA/dULC	-24.80	-9.74	-9.74	-19.28	-27.89		-22.90	-2.81		-24.80	-76.58	-30.83	-14.04	-62.10
dULC/dU	-0.66	-1.36	-1.42	-5.69	-2.48		-0.01	-0.01		-0.66	-0.66	-1.36	-1.36	-1.42
dU/dY	-0.31	-0.26	-0.32	-0.28	-0.28		-0.22	-0.26		-0.31	-0.31	-0.26	-0.26	-0.32
indir	**-5.01**	**-3.47**	**-4.49**	**-30.34**	**-19.71**		**-0.05**	**-0.01**		**-5.01**	**-15.48**	**-10.99**	**-5.00**	**-28.62**
total dCA/dY	**-18.58**	**-17.70**	**-18.72**	**-35.42**	**-40.91**		**-21.75**	**-31.15**		**-18.58**	**-30.10**	**-20.73**	**-7.81**	**-107.83**
how much less growth for -1%pt dNX														
	-5.38	-5.65	-5.34	-2.82	-2.44		-4.60	-3.21		-5.38	-3.32	-4.82	-12.81	-0.93

So, how bad will it be?

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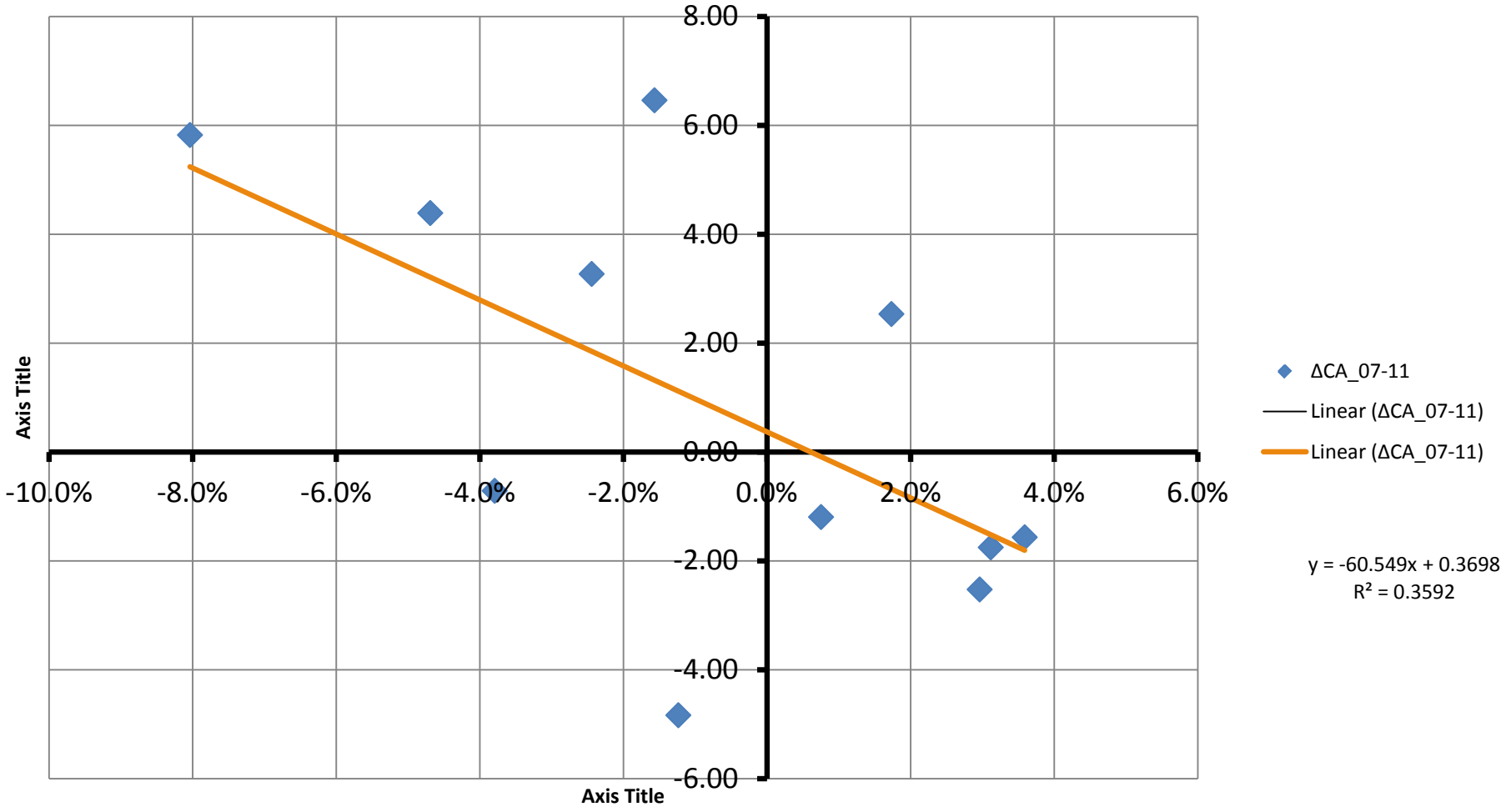
- We get dCA of -0.2 to -0.4
- To reduce the average CA deficit of the GIIPS(5) we find a GDP reduction of 47%, both for 1990-2011 and 1999-2011 sample and 23% for the recessions-only sample.

- For comparison: a back of the envelope calculation
- OECD's Turner and Saghazza (1999): sacrifice ratio (GDP/inflation) = 3.75
- If trade deficit countries have to reduce the price level by 20% → 75% GDP

Δ(NX/Y) and ΔY 2007-2011 cross country gives a higher value ≈ -0.6



Conclusions

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How can the Euro area rebalance?

- *Either* deficit countries will be trapped for a decade in a Great Depression
- *Or* surplus countries pursue inflationary policy.
- Need for an symmetric adjustment!
- Short: Europe needs much higher wage growth in Germany (surplus countries).